A technique for septal placement of right ventricular leads in patients with complex congenital heart disease using angiographic technique

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Introduction: Transvenous pacing in patients with complex congenital heart disease (CHD) is challenging. Ventricular lead position in anterior wall or apex can lead to ventricular dysfunction. This study is to assess the utility of intraprocedural angiography as an aid in guiding septal placement of ventricular leads during transvenous permanent pacemaker implantation in patients with CHD.

Methods: The study group consisted of patients with CHD and Class I or Class IIa indication for permanent pacemaker implantation and no contraindication for intravenous contrast agents. Angiography was performed through a pigtail catheter placed in the venous atrium/ventricle in the AP, LAO 40 degrees, and RAO 30 degrees using non-ionic contrast agent. Angiography was done to define the intracardiac anatomy and to guide to placement of ventricular lead in the mid/anterior septum. Procedural success was defined as successful placement of the ventricular lead at the septal location that was validated by computed tomography (CT).

Result: We used angiography for septal lead placement in 26 patients with CHD from January 2006 and July 2018. The study cohort included 7 post-surgical patients with repaired complex congenital heart disease and 19 patients with uncorrected congenital heart disease. The indication for permanent pacing was symptomatic AV block in 23 patients and sick sinus syndrome in 3 patients. The mean age was 19 + 8 years with male to female ratio of 16:10. The most common underlying CHD was corrected transposition of great arteries (ccTGA). Cardiac CT was performed in 24/26 patients and the ventricular lead was in the anterior septum in 19 and mid-septum in 7 patients. The mean paced QRS duration measured by electronic calipers was 132+10 ms. The mean contrast used during the pacemaker implantation was 100+20 ml with average fluoroscopy time of 10 + 3 minutes. The acute procedural success was 100%. All patients tolerated the procedure well and there were no complications associated with the implantation procedure. There were no lead dislodgements or device related issues on follow up. The average duration of follow up was 44+18 months.

Conclusion: Venous angiography assists the implanter to gain real time knowledge of the complex anatomy and serves as a useful aid for septal lead placement in patients with complex CHD. Angiography is safe and can be considered as an additional imaging technique during pacemaker implantation in complex CHD.